LAT 39.09293 LON -120.73021

COPY

UNITED STATES DEPARTMENT OF AGRICULTURE FOREST SERVICE RO

REPLY TO: 3430 Evaluation DATE: February 26, 1985

SUBJECT: Biological Evaluation of Gouty Pitch Midge In Foresthill Seed Orchard (Report No. 85-11)

TO: Forest Supervisor, Tahoe National Forest

Larry Binder, Foresthill Seed Orchard Manager, requested an evaluation of a gouty pitch midge, Cecidomyia piniinopis, infestation in a grafted ponderosa pine clone bank. Some of the trees were grafted into the orchard as early as 1968, but most are of more recent origin. The midge infestation has caused noticeable flagging since about 1980. The area was examined on January 22, 1985, by Larry Binder and Dave Schultz, Entomologist from the FPM Staff.

Observations

The grafted ponderosa pine in the area examined ranged from sapling size trees which were a few years old to the oldest grafts which were 14-16 inches dbh. No current flagging from the gouty pitch midge was visible in the seed orchard. Every tree examined had scars on the branches from past infestations of the midge. The most extensive visible damage was on some 2-3 inch dbh grafted pines that were transplanted about 2 years ago. Feeding by the midge larvae killed and distorted many branches on the newly transplanted trees. Heavy wet snow has also contributed to the disfigurement of the younger grafts. The last whorl or two of growth on all trees in the orchard appears to be of normal shape, size and color. The older grafts had numerous cones in spite of many feeding scars on the branches caused by midge larvae.

Discussion

Gouty pitch midge adults emerge in the spring. This occurs about mid - to late - April at the Seed Orchard. They lay eggs on newly expanding shoots. Larvae hatch and bore into the vascular tissue. The larvae construct feeding pits where they remain until the following spring. In late winter or early spring the larvae crawl out of the feeding pits onto the needles. The larva constructs a small white cocoon on a needle from which the adult emerges.

If there are only a few midge feeding pits on a tree, there will be no detectable effect. If there are enough pits to girdle the shoot, it will die. Pits distributed only along one side of a shoot will

result in a crook. If an infested shoot does not die, the scar from the feeding pit is visible until it calluses over.

Very few trees have been killed by the gouty pitch midge, but heavy and repeated attacks can reduce growth. Vigorous, rapidly growing trees are just as heavily attacked by the midge as slower growing trees, but trees which are growing slowly or are under stress show greater damage from the same level of attack.

Some ponderosa pine are infested by the midge almost every year while others are rarely, if ever, infested. The differences in susceptibility are related to the surface of the new shoots in the spring. Trees with shoots having sticky, resinous surfaces are more prone to injury than those with shoots that are either dry and smooth, or covered with a waxy bloom. Trees with sticky, resinous new shoots ordinarily comprise about one-third of a natural stand. Shoot characteristics are apparently inherited and may have some implications for the Tree Improvement Program.

The effects of midge infestation on cone and flower production is unclear. If larval feeding pits are numerous enough to girdle the shoot, there will obviously be no cones or flowers produced. On the other hand, some branches in the Seed Orchard which have numerous scars from old feeding pits also have numerous cones. Many types of tree stress induce a heavier than normal cone crop and it may be that the resin midge is actually enhancing cone production.

One of the impacts of midge infestation on the Tree Improvement Program is that scions which are infested with the midge do not graft well. One method of overcoming this problem is to use bud grafts. Flagging due to midge girdling does not occur until spring or early summer of the year after the shoot was infested. The midge infests only shoots, and not buds. Feeding is slow during the winter, so buds collected in January which look and feel healthy should be graftable, regardless of whether the shoot is infested or not.

If bud grafts cannot be used and scion wood is necessary, it would be possible to protect the scions during the year previous to scion collection by using an insecticide. Scion collection would have to be anticipated at least 9 months in advance. If it was known that scions would be collected during January of a given year, individual branches or trees could be treated about mid - April of the previous year, the period of midge emergence and egg laying. Orthene Tree and Ornamental Spray (EPA Reg. No. 239-2427) is registered for use on pines, and has been used successfully to control another midge (Douglas-fir needle midge) at the rate of 2/3 lb. per acre.

The same material could also be used to treat newly transplanted trees. Transplanting will stress the trees and any midge attacks will cause greater damage than on nearby well-established trees. Treating ponderosa pine during the season of transplanting would be a reasonable precaution against further stresses on the tree.

Management Alternatives

1. Do nothing. Midge damage will fluctuate with population levels and tree stress. Some trees will be unsightly at times but none would be expected to die. Damage to newly transplanted trees will slow their growth and delay the point at which they enter production. Some scion wood collected will not take after grafting. Tip flagging caused by complete girdling and stress crops caused by partial girdling will probably cancel each other and result in little or no net difference in flower and cone production.

2. Treat entire orchard with insecticide. A properly timed application should eliminate most midge damage for that year. Some trees will still be unsightly because the treatment will not make previously existing damage disappear. The net effect on flower and cone production is uncertain. There will not be a cone and flower loss due to flagging, but there will also be no stress crop stimulation due to partial girdling and there may be an increase in conelet abortion due to the slight phytotoxic effects of Orthene. Scion wood would be protected, including many trees from which grafting material will not be collected. The use of an insecticide would require the expenditure of time and money, a pesticide-use proposal, and environmental documentation.

3. Treat selected branches or trees with insecticide to protect scion wood. Treatment of branches or trees in mid-April should keep most of the scion wood free of midge damage until they are collected the following January. Applications of Orthene shortly before grafting material is to be collected should be avoided. The slight phytotoxic effect of this systemic insecticide may interfere with healing of the grafting wound. The use of an insecticide would require the expenditure of time and money, a pesticide use proposal, and environmental documentation.

4. Use buds for grafting. If rootstock of the right size is available, the use of buds for grafting would avoid midge-damaged material, which is the same goal as Alternative 3. The advantages this offers are that there is no need to take action on an insecticide project 9 months prior to collecting grafting material and that it also eliminates the need for the money, time and paperwork that the insecticide application would require.

5. Treat least healthy trees with insecticide. A small number of trees in the Seed Orchard have fairly poor crowns resulting from a combination of transplant shock, snow damage and midge infestation. A single treatment to prevent midge infestation has the potential to give them at least one complete healthy whorl of foliage. This should speed them toward production. Supplemental watering, fertilization and weeding would assist in this effort and may, in fact, produce the desired effect without insecticide treatment. The insecticide treatment would require the expenditure of time and money, a pesticide-use proposal, and environmental documentation.

6. Use genetic selection. The phenotypes of the new shoots of the grafted trees in the Seed Orchard could be determined in the spring. If progeny from these trees are present in test outplantings, their phenotypes might also reveal whether any of the Seed Orchard Trees are heterozygous for the trait of midge susceptibility. It might be prudent to delete trees which are carrying the susceptible trait from the Region's Tree Improvement Program. This should reduce the concerns over gouty pitch midge damage in the Seed Orchard as well as improve the quality of stock from the Tree Improvement Program. The trait of spring shoot characteristics could also be used as one of the criteria for any new ponderosa pine selections.

If you need clarification about any of the management alternatives, please call Dave Schultz on my staff at 415-556-4322

/s/ W.L. Freeman
WILFRED L. FREEMAN, JR., Director
Forest Pest Management

Genetics evaluation of early selection in Douglas-fir seed orchard

MAILING LIST #6 (TREE IMPROVEMENT PROGRAM I&D's) REPORT NO. 83-11

2/26/85

1 FPM, WO
1 FIDR, WO
1 M.D. Srago, TM, R-5
1 W.R. Beaufait, TM, R-5
1 R. Cates, TM, R-5
1 Gary Fiddler
1 FPM-Davis: Jack Barry
1 Univ. of Alberta, Canada
1 Simon Fraser Univ, Canada
1 U.C. Riverside: L.R. Brown
1 FPM Admin. Group, R-5 (w/copy of list)
1 Ladd Livingston, Idaho Dept. Lands
0 WESTFORNET-PSW (w/cover memo from WLF)
5 WESTFORNET-INT (w/cover memo from WLF)
~~1 BrB: Groffenius, R-5~~
0 Jay Kitzmiller, CTIC Chico*
1 Chuck Frank, N. Zone Tree Impr. Grp. Klamath NF
1 Gaylord Parks, Central Zone Tree Eldorado NF

1 FPM, MAG
1 W.G. Charter, TM, R-5*
1 J.N. Fiske, TM, R-5
1 Forestry Dept., Humboldt State U: Bill Bigg, John Stuart
1 Canadian Forestry Service, Victoria, B.C., Can.
1 yeun pyo Kim, Seoul, Korea
12 R. Hunt, CDF
1 Roy Richards
1 John Pierce, FPM (w/copy of list)
1 Biol. David Cibrian Tovar
Laboratorio de Entomologia Forestal
Departmento de Bosques
Universidad Autonoma Chapingo
Chapingo, Estado de Mexico, Mexico
1 Forestry Library, UC Berkeley
1 Univ. of Idaho: Mal Furniss, R.W. Stark

7 PSW people: M.I. Haverty, R.H. Smith, C.J. DeMars, W.D. Bedard, G.T. Ferrell, P.E. Tilden, T.W. Koerber, W.J. Otrosina, R.F. Scharpf, C.B. Williams, Ben Spada, F.T. Ledig, P.J. Shea, J.L. Robertson, R.E. Stewart, E.F. Bell R.J. Laacke, PSW, 2400 Washington Ave., Redding, CA 96001

8 UC Berkeley people: D.L. Dahlsten, R.W. Cobb, W.E. Waters, J.R. Parmeter, W.J.A. Volney, C.S. Koehler, D.L. Wood, A.H. McCain

4 Other-Region FPM Staff Directors: R-6, R-4, R-3, R-2, R-1, R-10 (Anchorage), NA (4), SA (4) [addresses in FS Org. Directory]
4 Other R-5 Staff people: Staff Directors: TM, CFF, AP&D, OI
5 FES people (other than PSW): PNW, Corvallis: E.E. Nelson, G.E. Daterman; RM: F.G. Hawksworth; PNW, LaGrande, OR: B.E. Wickman; SO, Pineville: P.L. Lorio

4 Coop. Extension Foresters: Tom Robson, Pete Passof, Paul Smith, Rick Standiford
0 National Forest Supervisor(s)
0 R-5 National Forest Ranger District(s)

2 Others: Gil Murray, CFPCAC Chairman
Larry Camp, IRS

108 TOTAL COPIES NEEDED

*Sent 2/26/85

SEND WLF "Late Memo" to those with * (2)